

## Vacuum Cleaner Current-Carrying Hose Connection System

### Technical Field

5     **[0001]**     The invention relates to vacuum cleaners, and particularly to a connection system for connecting a vacuum cleaner current-carrying hose to a second vacuum cleaner current-carrying hose, to a handle part, to a vacuum cleaner body or to a wall outlet.

### Background

10   **[0002]**     Many modern vacuum cleaners transmit electrical current from the body of the vacuum cleaner to a power nozzle via wires arranged in a helix along the length of the vacuum cleaner hose. Typical vacuum cleaner current-carrying hoses have a first end adapted to receive current from the body of the vacuum cleaner and a second  
15   end adapted to transmit current to a handle part.

**[0003]**     A significant limitation of existing vacuum cleaner current-carrying hoses is that the first and second ends do not use the same connection system so that two current-carrying hoses cannot be coupled  
20   together in a manner that would enable an extension current-carrying hose to be added between the first current-carrying hose and the handle part. There exists a need for a connection system for vacuum cleaner current-carrying hoses and handles that will allow a vacuum cleaner current-carrying hose to be connected to either a handle part or to a  
25   second current-carrying hose.

### Summary of Invention

**[0004]**     According to the present invention, a vacuum cleaner current-carrying hose connection system has a female connection end on  
30   a first vacuum cleaner current-carrying hose adapted for receiving a male connection end on a second vacuum cleaner current-carrying hose. The male connection has at least two male receptor plugs configured for inserting into female receptor holes in the female connection end.

**[0005]** The invention also provides for vacuum cleaner hose connection system having a male connection end that has at least two male receptor plugs for transmitting current, a female connection end  
5 having at least two female receptor holes for receiving the male receptor plugs, and the male and female connection ends being rotatably movable about the longitudinal axis of the female connection end between an unengaged position and an engaged position.

10 **[0006]** The invention provides a vacuum cleaner handle part having a male connection end adapted for engagement with a female connection end on a current-carrying hose, the female end being rotatably movable about the longitudinal axis of the female end between a position engaged with the handle part and an unengaged position.

15 **[0007]** The invention provides a female connection end for a vacuum cleaner current-carrying hose having at least two female receptor holes for receiving male receptor plugs carrying current and means for engaging with a male connection end via rotation about a  
20 longitudinal axis of the female connection end.

**[0008]** The invention provides a male connection end for a vacuum cleaner current-carrying hose having at least two male receptor plugs for transmitting current to female receptor holes and means for engaging  
25 with a female connection end via rotation about a longitudinal axis of the male connection end.

#### Brief Description of Drawings

**[0009]** In Figures which illustrate non-limiting embodiments of the  
30 invention:

Figure 1 is a side view of a preferred embodiment of a male connection end of the system of the present invention;

Figure 2 is a side view of a preferred embodiment of a female connection end;

5        Figure 3 is a top view of the male connection end shown in Figure 1;

Figure 4 is a top view of the female connection end shown in Figure 2;

10       Figure 5 is a first side view of the male connection end shown in Figure 1 with the hard cover removed;

Figure 6 is a second side view of the male connection end shown in Figure 1 with the hard cover removed;

15       Figure 7 is a side view of the male and female connection ends shown in Figures 1 and 2 with the hard covers removed and in a partially engaged position;

Figure 8 is a side view of the male and female connection ends shown in Figures 1 and 2 with the hard covers removed and in a fully engaged position;

20       Figure 9 is a perspective view of the female connection end shown in Figure 2;

Figure 10 is a side view of a preferred embodiment handle part male connection end along with the female connection end shown in Figure 2;

25       Figure 11 is a side view of a second embodiment of a male connection end;

Figure 12 is a side view of a second embodiment of a female connection end;

Figure 13 is a top view of the male connection end shown in Figure 11;

30       Figure 14 is a top view of the female connection end shown in Figure 12; and

Figure 15 is a side view of a second embodiment handle part male connection end along with the female connection end shown in Figure 12.

5    Description

[0010]        Throughout the following description, specific details are set forth in order to provide a more thorough understanding of the invention. However, the invention may be practiced without these particulars. In other instances, well known elements have not been  
10    shown or described in detail to avoid unnecessarily obscuring the invention. Accordingly, the specification and drawings are to be regarded in an illustrative, rather than a restrictive, sense.

[0011]        Figures 1 and 2 show a male connection end **10** and a  
15    female connection end **80** of a current-carrying hose system made in accordance with a preferred embodiment of the invention. The male connection end **10** and the female connection end **80** are both connected to a flexible vacuum hose **20** having a current-carrying cord wound round in a helix. The male connection end **10** has a hard shell **30** that is  
20    snugly attached to the male connection end's contoured leading lip **40**. Two male receptor plugs **50** protrude from the contoured leading lip **40**. An inner vacuum tube member **60** protrudes out of the male connection end **10** and has a guide button **70** on each side. Female connection end **80** has a hard protective shell **90** attached snugly to the female  
25    connection end's contoured leading lip **100**.

[0012]        Figure 3 shows a top view of the male connection end **10** according to the preferred embodiment of the invention, and shows a screw **110** that is used to attach the hard protective cover **30** to the  
30    remainder of the male connection end **10**.

**[0013]** Figure 4 shows a top view of the female connection end 80 according to a preferred embodiment of the invention, showing screw **120** that is used to attach the hard protective cover **90** to the remainder of the female connection end **80**.

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**[0014]** The inner portions of the male and female connection ends **010** and **80** are best illustrated with reference to figures 5 to 8 showing the protective hard covers **30** and **90** removed. Figures 5 and 6 show the alternate side views for the male connection end **10**. The male  
10 connection end **10** has a short flange **210** and a long flange **220**, each protecting and attached to a circuit board **230**. Each circuit board **230** is attached to two conducting leads **240**, and each conducting lead **240** is in contact with one of four conducting loops **250**. The four conducting loops **250** are spaced apart by insulating non-conducting loops **260**. The  
15 conducting loops **250** and the insulating loops **260** extend circumferentially around the vacuum hose. The front portion of the male connection end **10**, including the contoured leading lip **40** and the short and long flanges **210** and **220**, is freely rotatable around a longitudinal axis extending through the inner vacuum tube member **60**.  
20 Vacuum tube **60** extends into pipe **20** through a seal member. As the front end of the male connection end **10** rotates, the conducting leads **240** remain at all times in contact with the conducting loops **250**. Spacer knobs **310** extend out of the short and long flanges **210** and **220**, through the short and long circuit boards **230**. The spacer knobs **310**  
25 hold the circuit boards **230** in position and help prevent the circuit boards **230** from touching the conducting loops **250**.

**[0015]** Each conducting loop **250** is attached to one wire from the helix of wires in the current-carrying cord **20**. Each conducting loop  
30 **250** is also connected to one conducting lead **240**, which in turn is connected via a wire on the circuit board **230** to an insulated wire **270**.

For each conducting lead **240** on each circuit board **230**, the electrical connection travels on an opposite side of the circuit board **230** to a separate insulated wire **270**. Each insulated wire **270** is connected to one of the male receptor plugs **50**. The connection between the  
5 insulated wires **270** and the male receptor plugs **50** is shown as a welded joint in figures 5, 7, and 8 and is shown using female electric push/slide connectors **265** in figure 6. It is to be understood that the connection between the insulated wires **270** and the male receptor plugs **50** can be by any suitable means. The male receptor plugs **50** are attached firmly  
10 to the front portion of the male connection end **10** by a plug mounting cover **280**, which in turn is held in place by a plug mounting screw **285** attached to a mounting screw receptacle **287**. A screw **290** and nut **300** combination are shown in figures 5 to 8 for firmly connecting two halves of the male receptor end, if the male receptor end is made by two  
15 pieces.

[0016] While figures 5 and 6 are similar, they illustrate opposite sides of the male connection end **10**. The configuration of the insulating wires **270** and the location of the short and long flanges **210** and **220** are  
20 slightly different for each side.

[0017] Figure 7 shows the male connection end and the female connection end in a partially engaged position. To achieve this position, the guide buttons **70** on the male connection end **10** are first slid through  
25 the guide button receiving channels **400** in female connection end **80**, as illustrated in figure 9. With the guide buttons **70** in position, a twisting action will result in the male receptor plugs **50** being guided into place within the female receptor holes **130** each time the ends are connected. A guide button receptor **410** helps keep the male and female connection  
30 ends **10** and **80** held together when in fully engaged position.

[0018] Figure 8 shows the male and female connection ends **10** and **80** in fully engaged position. Female receptor leads **350** contact the male receptor plugs **50** when the male and female connection ends **10** and **80** are in the fully engaged position. The female receptor leads **350** are in electrical communication with insulated receptor wires **270** via electrical circuit pathways **360**. The remaining inner workings of the female connection end **80** are similar to the male connection end **10**, including conducting loops **250**, insulating loops **260**, short and long flanges **210** and **220**, and conducting leads **240**.

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[0019] Figure 10 shows a handle part **500** along with a female connection end **80**. The handle part **500** has male receptor plugs **50** and an inner vacuum tube member **60** with a guide button **70**, all similar to the male connection end **10**. The handle part **500** has a leading end **510** and a hard protective cover **520**. The handle part **500** is further shown with an on/off switch **540** and with an inner vacuum tube pipe **550**.

[0020] As can be appreciated with references to figures 1 to 10, the preferred embodiment uses the same type of connection between the vacuum cleaner current-carrying hose **20** and a second or third vacuum cleaner extension hose as it does with the handle part **500**. This will allow for easy operation with a single vacuum hose or with any number of extensions of similar vacuum hoses, which may or may not be of similar length to the first hose. As described briefly above, the front portion of the connection ends **10** and **80**, including the hard covers **30** and **90** are freely rotatable about the longitudinal axis of the connection end. The preferred embodiment provides a simple and easy to use mechanism to connect a vacuum hose to a handle part **500** or to a second vacuum hose without requiring the pushing of buttons or straight pulling apart of connections. Engaging and unengaging the connection can be carried out by twisting.

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**[0021]** Inner vacuum tube pipe **550** is in communication with inner vacuum tube member **60** and may form a single tube.

5 **[0022]** Figures 11 and 12 show a male connection end **580** and a female connection end **590** according to a second embodiment of the invention. The male receptor end has four male receptor plugs **620**, a straight leading lip **610**, and a hard protective shell **600**. The female receptor end has female receptor holes (not shown) that will line up with  
10 the male receptor plugs **620**. The female connection end has a connection mechanism **650** in communication with a connection mechanism button **660**. The connection mechanism **650** fits into a corresponding receptor hole (not shown) in the male connection end **580**.

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**[0023]** Figures 13 and 14 show top views of the male and female connection ends according to the second embodiment.

**[0024]** Figure 15 shows a handle part **700** with a female  
20 connection end **590** according to the second embodiment of the invention. The handle part **700** has male receptor plugs **620**, an inner vacuum tube member **60** and guide buttons **70** similar to the male connection end **580**. The handle part **700** has a leading lip **710** and a hard shell cover **720**. The handle part **700** further shows an on/off  
25 button **740** and an inner vacuum tube pipe **750**. As will be appreciated with references to figures 11 to 15, the second embodiment has a straight leading edge connection between the male and female parts. The use of the uniform male and female connection end system allows the easy insertion or removal of an extension hose between a first  
30 vacuum hose and a handle part.

**[0025]** A basic implementation of the invention requires a male/female connection system at one end of the main hose. The connection system can connect the hose to a vacuum cleaner body or to a wall outlet of a built in vacuum cleaner at one end and/or it could  
5 connect the hose to the handle part. This description has described the connection system applying between a hose and a handle part, however it is to be understood that this system could be used between a hose and a vacuum cleaner's main body or a wall outlet. It is further possible to have a connection system at both ends of the main hose, in which case  
10 the main hose would likely have one male connection end and one female connection end according to this invention. Implementing the connection system at both ends of the main vacuum cleaner hose, namely to connect to the handle part and to the main body, would allow a main hose to have both a male connection end and a female connection  
15 end, allowing main and extension hoses to be interchangeable.

**[0026]** Connecting two hoses together according to the invention provides a swivel at the join of the hoses, which reduces or eliminates kinking in the middle of the extended hose. The ease of opening the  
20 join between two hoses further facilitates access to any clogs that may have occurred in the extended hose.

**[0027]** As will be apparent to those skilled in the art in the light of the foregoing disclosure, many alterations and modifications are  
25 possible in the practice of this invention without departing from the spirit or scope thereof. For example, current-carrying vacuum hoses have been described as having a current-carrying cord wound round in a helix, however it is to be understood that this invention can be practiced with cords that carry a relatively straight current-carrying cord inside or  
30 outside the vacuum cord. Accordingly, the scope of the invention is to

be construed in accordance with the substance defined by the following claims.